



Dart Aerospace Ltd.
1270 Aberdeen St
Hawkesbury, ON
K6A 1K7
Canada

Tel (613) 632-5200

Sold

D412-664-403
Job Sheet 171058



Part No: D412-664-403

Job Qty: 1 ea

Part Name: 412 Stainless Steel Aft Crosstubes - High



Part Weight: 0 lbs

Status: Scheduled

Priority: Medium

Job Created: 1/26/18

Job Tracking No:

Due Date: 1/31/18

Created By: Marie Lajeunesse

Type: Stock

Description:

Note: D412-664-443 REV.B/ IIN-D212-664 REV.I IPP REV:A 13.10.25 NEW ISSUE DD VERF:JLM IPP Rev.B
17.06.26 As per Dwg/Chg/PAR16-545 DP Verify DD

Ship Via:

Bill of Materials

Job Routing

Op No	Operation	Qty	Start Date	Due Date	Standard		Workcenter/Supplier		Sign-off
					Setup hrs	Run Hrs	Workcenter / Supplier	Lead Time	
90	Start up Operation	1 Ea		1/30/18	0.00	0.00	Start Up Crosstubes-2		GP
110	CNC Bend Crosstubes	1 pcs		1/30/18	0.00	5.88	CNC Bend Crosstube		
127	QC	1 pcs		1/30/18	0.00	0.00	QC15		
128	Crosstubes	1 pcs		1/30/18	0.00	2.78	Crosstubes-2		
130	Crosstubes	1 pcs		1/30/18	0.00	2.78	Crosstubes-2		
140	QC	1 pcs		1/30/18	0.00	0.00	QC6		
174	Outsource	1 pcs		1/30/18	0.00	0.00	Outsource2		
176	Packaging	1 pcs		1/30/18	0.00	0.00	Packaging2		
178	QC	1 pcs		1/30/18	0.00	0.00	QC5		
180	SprayPaint	1 pcs		1/30/18	0.00	2.70	Spray Paint		
190	QC	1 pcs		1/30/18	0.00	0.00	QC14		
200	Crosstubes	1 pcs		1/31/18	0.00	2.78	Crosstubes-2		
210	QC	1 pcs		1/31/18	0.00	0.00	QC5		
220	Packaging	1 pcs		1/31/18	0.00	0.00	Packaging1-4		
230	QC	1 pcs		1/31/18	0.00	0.00	QC4		
235	DC	1 pcs		1/31/18	0.00	0.00	DC		
240	Packaging	1 pcs		1/31/18	0.00	0.00	Packaging3-2		
250	QC21-FG	1 Ea		1/31/18	0.00	0.00	QC21		YD

Part Op 110 - Bend tube as per Dwg D412-664-443 using CNC bender program D412-664-443 ****USE (4) DT9824 SHIM BLOC

Descriptions: TO CHECK STRAIGHTNESS****

127 - ***MARK CUT LINES***

128 - CUT TUBE AT HEIGHT ON FAI SHEET VERF HEIGHT _____ BY QC 15 LEVEL INSPECTOR _____
VERF TWIST _____ BY QC15 LEVEL INSPECTOR _____

130 - 1- Drill Tube as per Dwg D412-664-443 Using DT8550/8551 Drill Jigs, Set-up drill table as per QSI 010 2 -Deburr 3-
Engrave Part # and Batch # as per Dwg D412-664-443 4-Remove all marks from tube within limits of D412-664-443
DWG.

174 - ISSUE P/O TO ACCUREN: _____

180 - ***USE AXALTA 230S PRE-TREATMENT AS PER QSI005*** AXALTA BATCH: _____ *** WEAR
LATEX GLOVES WHEN HANDLING CROSSTUBE*** ***VERIFY BY _____ BATCH # TO MATCH W/O

***VERIFY BY _____ PART # TO MATCH W/O _____ ***MASK SCRIBE
B# & P# AND VERIFY*** 1-Prime inside & outside cross tube as per QSI 005 4.2 BATCH: _____ 2- Apply matte
clear coat to underside of cross tube per QSI005 4.2 BATCH: _____ 3- MASK UNDERSIDE OF
CROSSTUBE AS SHONE ON DWG BEFORE PAINTING 4 -Paint Outside of Tube as per Dart QSI 005 4.2 BATCH:
_____ 5-Remove masking

200 - 1- *****LAY DOWN CORSTUBE ON TABLE AND PUT DT10302 PINS IN SADDLE HOLE FACING UP, USE

SCRAP

P.T.O.



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Container No: S071507



Part: D412-664-403

Job No: 171058

Serial No/Batch: S071507

Revision: B/J

Inspector:

Date: 06/15/10

QAD 2010

HOLE IN TAPE MEASURE TO PUT IN PINS FOR LOCATING CENTER OF CROSSTUBE. ***** Install center support using scotch-weld DP460 per QSI 015, as per DWG. note 12. Install supports clamps as per Dwg D412-644-443. .
 ENSURE CLAMPS ARE ON TOP OF CROSSTUBE SUPPORT Torque clamps on support to 80-100 IN-LBS AS PER DWG. A/R scotch-weld DP460 BATCH #: _____ EXP DATE: _____ 2- **IF NOT ALREADY PRESENT ON CHAFFING SHEILD.** Apply a thin coat of proseal 890 per QSI 015 on inside concave surface of chafing shield and let cure per manufacturer's instructions. Install prosealed chafing shield onto crosstube by applying a thin coat of proseal 890 onto crosstube. Be sure to eliminate any air gaps. Install and torque clamps on chafing shield to 40-50 IN-LBS AS PER DWG. A/R Proseal 890 Batch: _____ EXP DATE: _____ AFTER FINISH CURE TIME 24H START CURE TIME: _____ FINISH CURE TIME: _____ PRIOR TO PACKAGING RE-CHECK TORQUE ON CLAMPS AFTER CURED FOR 24H.
 210 - PRIOR TO PACKAGING RE-CHECK TORQUE ON CLAMPS AFTER CURED FOR 24H.
 235 - Photocopy bluefile & type labels per PPPD412-664-403 CHG002
 240 - Identify and pack for shipping as per PPPD412-664-443 Location: _____ PPP Rev: _____

Job BOM

Part / Item	Component Name	Quantity	Operation	Container
D412-664-443TRN	Crosstube Turning Detail	1 Ea (1 ea)	90-Start up Operation	
D4910-1	Chaffing Shield	2 Ea (2 ea)	200-Crosstubes	
MS21920-26	Clamp	4 Ea (4 ea)	200-Crosstubes	
D5380-1	Support	1 Ea (1 ea)	200-Crosstubes	
D5380-3	Support Base	1 Ea (1 ea)	200-Crosstubes	
NAS1805-4P	Nut	8 pcs (8 ea)	200-Crosstubes	
NAS6704-21	Bolt	8 pcs (8 ea)	200-Crosstubes	
AN6-40A	3/8-24 Bolt X 3" Long	4 Ea (4 ea)	220-Packaging	
AN6-41A	Bolt	2 Ea (2 ea)	220-Packaging	
MS21042L6	Nut	6 Ea (6 ea)	220-Packaging	
NAS1149D0663J	Washer	18 Ea (18 ea)	220-Packaging	

Job Allocations

Operation	Component Part	Required	Inventory	Allocated
90-Start up Operation	D412-664-443TRN	1	5	0
200-Crosstubes	D4910-1	2	6	0
	D5380-1	1	10	0
	D5380-3	1	10	0
	MS21920-26	4	30	0
	NAS1805-4P	8	23	0
	NAS6704-21	8	24	0
220-Packaging	AN6-40A	4	112	0
	AN6-41A	2	46	0
	MS21042L6	6	502	0
	NAS1149D0663J	18	1,268	0

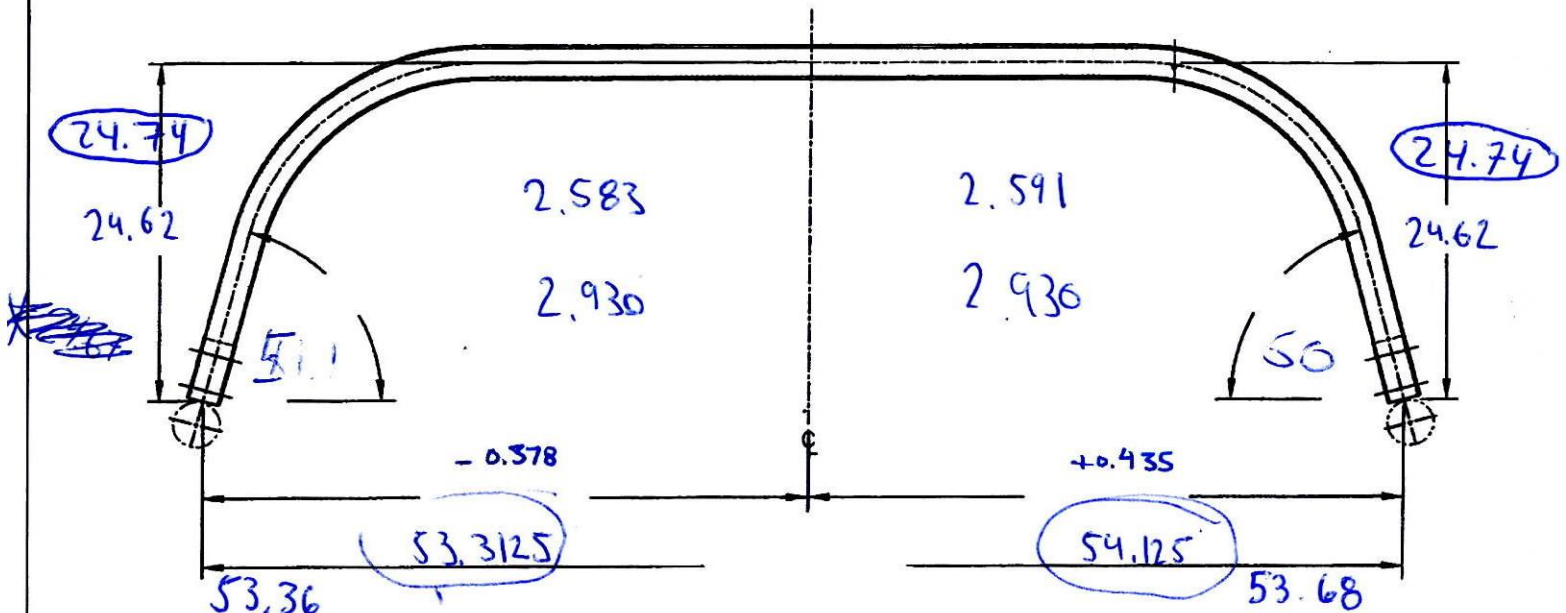
Part Specifications

Specifications could not be found.

Plex 1/26/18 12:46 PM Dart.lajeunesse.marie

DART AEROSPACE LTD		Work Order:	171038
Description: Crosstube High Aft (412)		Part Number:	D412-664-403
Inspection Dwg: D412-664-443	Rev: A <i>Dir 01.26</i>	Page 1 of 1	

Required Dimension	Min	Max
Height	24.12	24.62
1/2 Span	53.56	53.82
Angle	49°	52°
Total Span	107.12	107.64
Bending Passes	8	--
Crushing	--	7%



	Side A	Side B
Bending Passes	14	14
Crushing	6.3	6.1
Comments		

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	14.07.08	New Issue	KJ	UP

53.67 @ 24.74 high

Item	Qty	Part Number	Description
	443		
1	X	D412-664-443	CROSSTUBE ASSEMBLY (412 HI AFT)
2	1	D6020-132	CROSSTUBE MATERIAL
3	2	D4910-1	CHAFING SHIELD
4	1	D5380-1	SUPPORT
5	1	D5380-3	SUPPORT BASE
6	4	MS21920-26	CLAMP
7	8	NAS1805-4P	NUT
8	8	NAS6704-21	BOLT
9	A/R	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD
10	A/R	PROSEAL 890 OR 1422	SEALANT

GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6020-132
FINISHED LENGTH = 130.10±0.060 (BEFORE BENDING/TRIMMING)
- FINISH: PREPARE TUBE PER QSI 005 SECTION 4.1.4
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
APPLY MATTE CLEAR COAT TO UNDERSIDE OF CROSSTUBE PER DART QSI 005 4.2
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (ZN C6-2, HATCHED AREA)
PAINT OUTSIDE PER DART QSI 005 4.2
AFTER PAINTING, REMOVE MASKING
- TOLERANCES: PER DART QSI 018 UNLESS OTHERWISE NOTED.
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART P/N "D412-664-443" AND B/N ON INSIDE OF CUFF PER DART QSI 044 6.4 (VIBRATING STYLUS)
- WEIGHT: 87.8 lb FINISHED WEIGHT
- PART IS SYMMETRIC ABOUT CENTERLINE.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.

BENDING

- BEND PROGRESSIVELY WITH A MINIMUM OF 8 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 7% (BASED ON O.D.) IN LOWER HALF OF R35 BEND AND 6% (BASED ON O.D.) ON REMAINING TUBE.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038. TO BE PERFORMED AFTER FINAL POST-BEND GRINDING. ANY ADDITIONAL GRINDING REQUIRES ANOTHER LPI INSPECTION.

ASSEMBLY

- LOCATE THE D5380-1/3 SUPPORTS ONTO THE CROSSTUBE AS SHOWN IN THE ASSEMBLY DETAIL.
- ABRADE THE MATING SURFACES OF THE CROSSTUBE AND D5380-1/3 SUPPORT HALVES WITH 180-GRIT SANDPAPER. SATURATE A CLEAN CLOTH WITH MEK, 4105S WASH'N'WIPE DEGREASER OR EQUIVALENT AND WIPE CLEAN UNTIL THERE IS NO RESIDUE.
- APPLY A 0.04" TO 0.07" THICK LAYER OF 3M DP460 ADHESIVE ONTO THE CONCAVE SURFACE OF THE D5380-1 SUPPORT AND THE D5380-3 SUPPORT BASE.
- INSTALL D5380-1 SUPPORT ONTO THE CROSSTUBE AS SHOWN IN THE ASSEMBLY DETAIL AND INSTALL QTY (2) NAS6704-21 BOLTS INTO OPPOSING CORNERS OF THE D5380-1 SUPPORT. ALIGN THE BOLTS WITH THE HOLES ON D5380-3 SUPPORT BASE AND INSTALL ONTO THE CROSSTUBE.
- INSTALL THE REMAINING QTY (8) NAS6704-21 BOLTS AND QTY (8) NAS1805-4P NUTS, THEN EVENLY TORQUE THE NUTS IN A CRISS-CROSS PATTERN TO 80-70 IN-LBS. ENSURE A MINIMUM OF 1.5 THREADS ARE IN SAFETY.
- WIPE OFF EXCESS ADHESIVE USING A CLEAN CLOTH SATURATED WITH MEK, 4105S WASH'N'WIPE DEGREASER OR EQUIVALENT
- ALLOW DP460 ADHESIVE TO CURE FOR 24 HOURS.
- FILLET SEAL THE EDGES OF THE D5380-1/3 SUPPORT HALVES WITH PROSEAL PR1422 B1/2 OR PR890 B1/2 ALLOW PROSEAL TO CURE FOR 24 HOURS.
- IF NOT ALREADY PRESENT ON D4910-1 CHAFING SHIELD, APPLY A 0.015" TO 0.020" THICK COAT OF PROSEAL 890/1422 ON INSIDE CONCAVE SURFACE OF D4910-1 CHAFING SHIELD AND LET CURE PER MANUFACTURER'S INSTRUCTIONS.
- RECOAT THE D4910-1 CHAFING SHIELD WITH 0.015"-0.020" OF PROSEAL 890/1422 AND IMMEDIATELY INSTALL ONTO THE CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS. ENSURE THE D4910-1 CHAFING SHIELDS ARE WRAPPED TIGHTLY.
- TORQUE CLAMPS ON D4910-1 CHAFING SHIELD 40 TO 50 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON MS21920-26 CLAMPS AFTER ADHESIVES HAVE CURED FOR 24 HOURS.

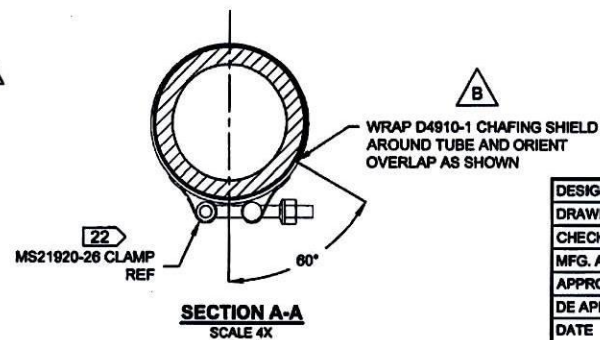
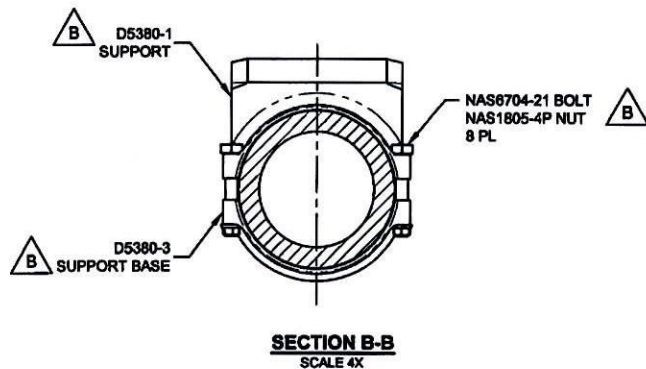
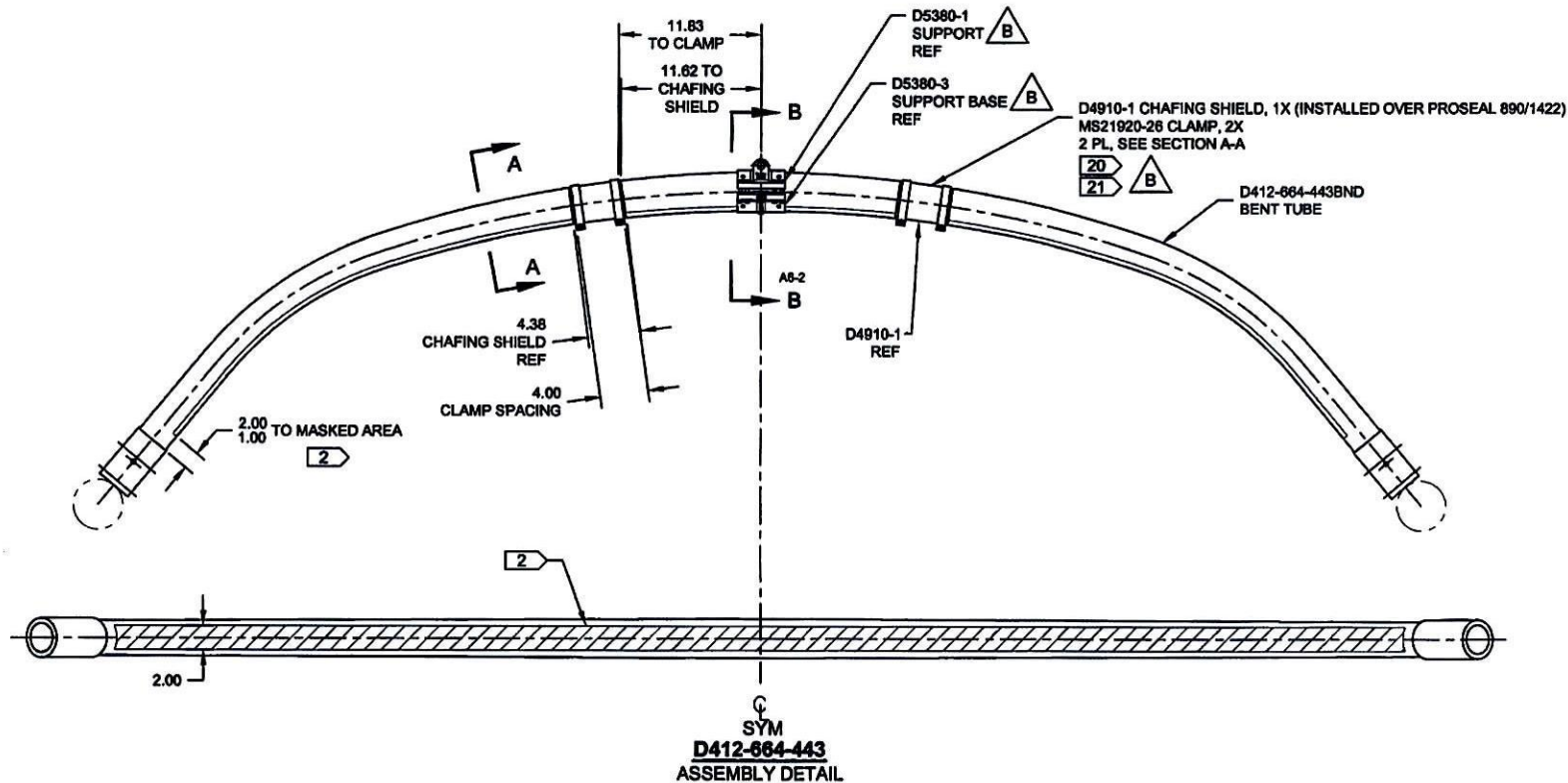
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18-01-26

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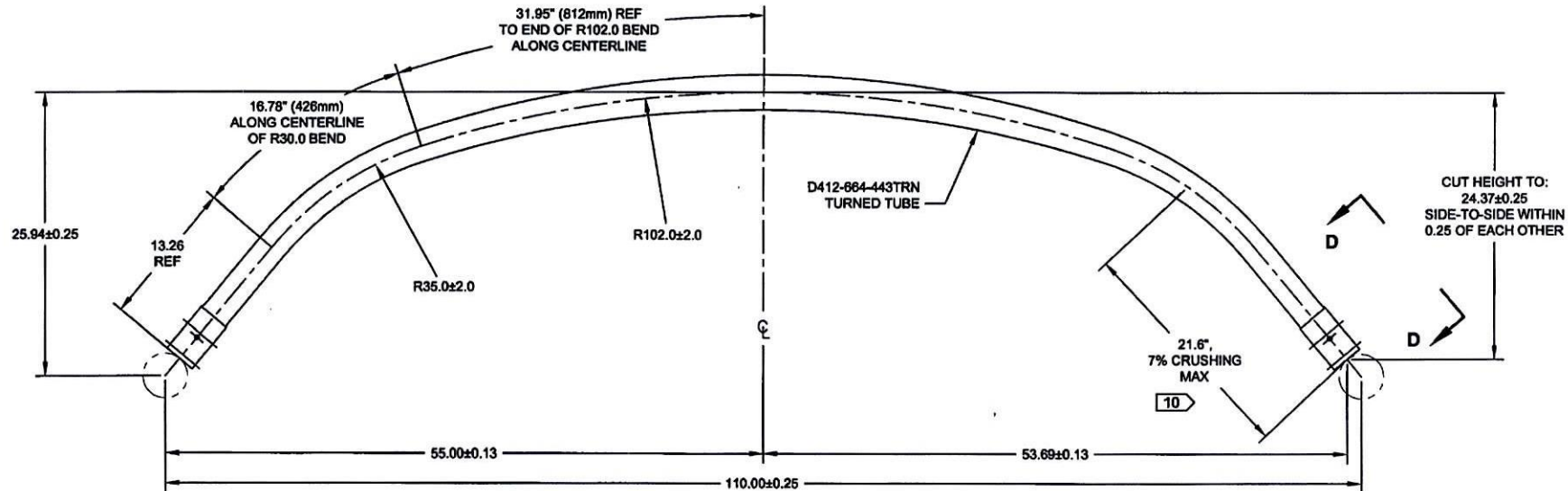
2017 JUN 21
ECN17-593

B	ADD ITEMS 4, 5, 7, AND 8. DELETED ITEMS D4909-1, MS21920-28 & D3595-063-530. NOTE 2 UPDATED FOR TUBE FINISH. ALL ASSEMBLY NOTES REWRITTEN. SHEET 2 SECTION A-A ANGLE DIM ADDED FOR CHAFING SHIELD INSTALLATION. ASSEMBLY DETAIL AND SECTION B-B UPDATED FOR INSTALLATION OF D5380-1/3.	AJS	16.11.03
A	NEW ISSUE	CP	14.04.01
REV.	DESCRIPTION	BY	DATE
DESIGN	CP	DART AEROSPACE LTD	
DRAWN	AJS	HAWKESBURY, ONTARIO, CANADA	
CHECKED	WJG	DRAWING NO.	REV. B
MFG. APPR.	WJG	D412-664-443	SHEET 1 OF 4
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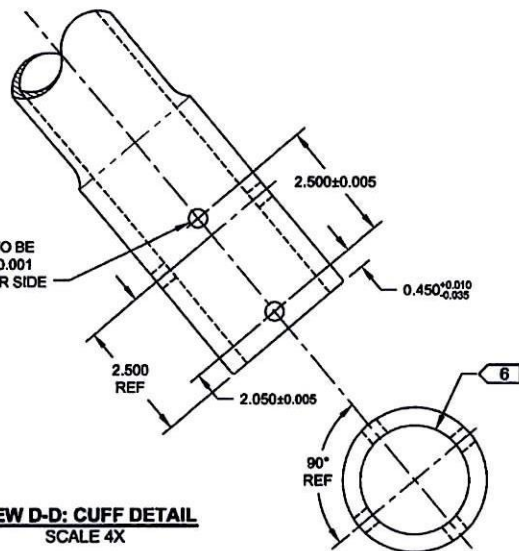


D412-664-443BND
BENDING DETAIL

10

Ø0.386^{+0.005}_{-0.000} HOLE TO BE
ALIGNED WITHIN ±0.001
OF HOLE ON OTHER SIDE
OF CUFF
2 PL

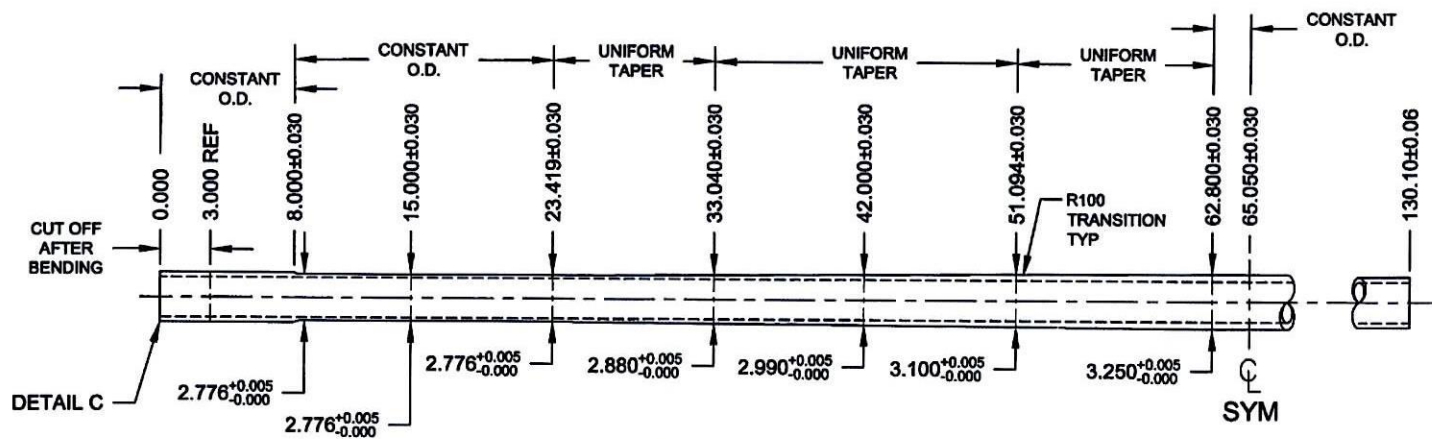
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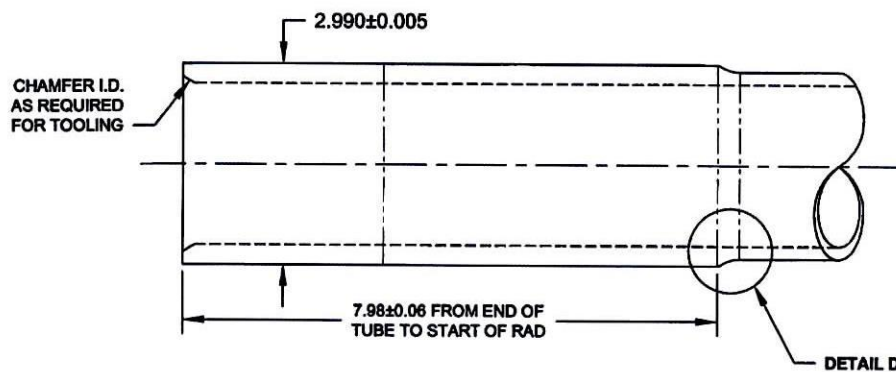
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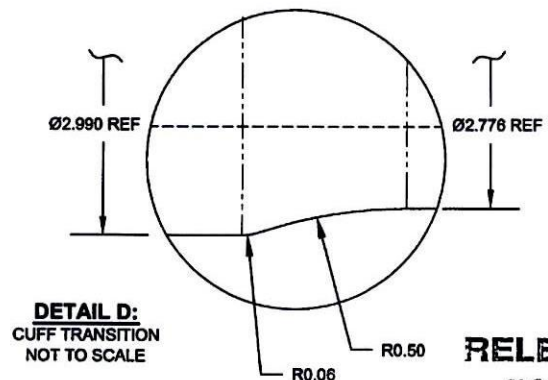
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D412-664-443TRN
TURNING DETAIL



DETAIL C:
CUFF TRANSITION
SCALE 4X



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2017 JUN 21

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DQA: _____ Date: _____

**WORK ORDER NON-CONFORMANCE / UPDATE**

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☒ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐																																																													
Date : 18/2/21		Step #: 110		QTY Effective : 1			MRB (QSI042) Approval DAS 12 9-89 18/2/20																																																										
Description Work Order Deviation				Disposition				Completed By																																																									
One side is bent narrow (-0.378 below nominal).				Scrap. Too narrow.				GP																																																									
Lead hand / Supervisor Approval Verification				QC / QA Coordinator Approval																																																													
DAS 9 9-89 18-06-04				DAS 9 9-89 18-06-04																																																													
Root Cause		FAULT CATEGORY																																																															
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐	Design ☐	Operator ☒	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐	Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐	Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐	Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐	Material ☒	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐	Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐	Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐	LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐	Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐	Past Expiry Date ☐	Manufacturing Process ☐	OTHER : _____			
Misidentified ☐	Past Due ☐																																																																